Claims

1. A lighting apparatus comprising:

a control unit providing display data packets set destination of communication by identifying information for a plurality of display units;

at least one terminal adaptors assigned terminal adaptor ID and connected with the control unit electrically via upper communication line;

the display units disposing at least one light emitting elements, assigned display unit ID, connected with the terminal adaptor electrically via lower communication line, and driving each of the disposed light emitting elements based on the display data packets provided by the control unit;

wherein

the display data packet includes al least the terminal adaptor ID and the display unit ID as an identifying information;

the terminal adaptor receives the display data packet having the identifying information including the terminal adaptor ID, which matches the terminal adaptor ID assigned to the terminal adaptor, and transfers the display data packet to the display units via the lower communication line; and

the display unit receives the display data packet having the identifying information including display unit ID, which matches the display unit ID assigned to the display unit, and drives the light emitting elements based on the display data packets.

2. The lighting apparatus according to claim 1, wherein

the control unit transfers frame cycle start packet stating start of frame cycle, the frame cycle start packet being assigned the identifying information stating to be received by all of the display units; and

the display unit performs frame synchronizing based on the frame cycle start packet.

3. The lighting apparatus according to claim 1, wherein

the display unit further comprises a memory storing at least display data;

memory space in the memory allocates data area in accordance with

circuitry in the display unit precedently; and

the control unit transfers communication packet and controls the display units by accessing to predetermined memory area of the display unit allocated precedently.

4. A lighting apparatus comprising:

a control unit providing display data packet to a plurality of display units;

at least one terminal adaptors assigned terminal adaptor ID and having a terminal adaptor side communication section connected with the control unit electrically via upper communication line; and

the display units assigned display unit ID, having a display unit side communication section connected with the terminal adaptor electrically via lower communication line, and driving at least one of the disposed light emitting elements based on the display data packets provided by the control unit;

wherein the terminal adaptors and/or the display units are arranged in n rows (n is two or more integer), each of the communication sections being connected each other serially at each of the rows;

the communication section of the terminal adaptors and/or the display units are connected which is arranged at end position of the lowest stream viewed from the control unit in m-th row (m is integer, which is $1 \leq m \leq n-1$) with which is arranged in (m+1)-th row at end position on same side as the communication section of the terminal adaptors and/or the display units is located in m-th row.

5. The lighting apparatus according to claims 1-4, wherein

communication at the upper communication line employs higher speed communication than communication at the lower communication line.

6. A communication method using display data packets in a lighting apparatus which comprises:

a control unit providing display data packets to a plurality of display units,

at least one terminal adaptors assigned terminal adaptor ID and connected with the control unit electrically via upper communication line;

the display unit having display section which drives at least one of disposed light emitting elements based on the display data packets provided by control unit, and a memory which has memory space in accordance with arrangement of the light emitting elements, number of color tones constituting one pixel and gradation number, the display unit being assigned display unit ID, and connected with the terminal adaptor electrically via lower communication line; and

wherein the display data packet further comprises at least identifying information area retaining the terminal adaptor ID and the display unit ID, memory space allotting area allotting memory space of the display units to be input, display data area having display data in accordance with arrangement of the light emitting elements, and number of color tones constituting one pixel and gradation number.

7. A display unit comprising a display section disposing a plurality of pixels constituted by at least one light emitting elements in matrix, a communication section performing packet communication, a memory storing at least one frame display data, a driving section driving each of the light emitting elements of the display section wherein

the display unit further comprising a control section generating blank signal stating start of driving cycle for each line based on frame cycle start packet stating start of frame cycle received by the communication section; and

the driving section reads the display data stored in the memory based on the blank signal for each of line, and drives each of the light emitting elements to display image in the display section.

8. The display unit according to claim 7 wherein

the memory further stores shift timing data stating time from receiving the frame cycle start packet to generating the blank signal; and

the control section generates the blank signal based on the shift timing data after receiving the frame cycle start packet.

9. The display unit according to claim 7-8, wherein

the memory has two or more image data memory areas storing the display data per frame, and during the display section displays image based on the display data stored in one of the image data memory areas, the display section stores the display data received by the communication section at other image data memory areas.

10. A communication circuit comprising:

a first communication section having a first transmitting section and a first receiving section;

a second communication section having a second transmitting section and a second receiving section;

a communication control section controlling communication at the first communication section and the second communication section;

receiving processing section performing receiving process based on received communication data;

wherein the first communication section and the second communication section distinguishes predetermined communication data; and

in case either the first communication section or the second communication section receives the predetermined communication data alternatively, the communication control section controls to input the communication data received by the communication sections receiving the predetermined communication data into the receiving processing section, and to input the communication data into other communication sections so as to input communication data received by other communication sections into the transmitting section of the communication sections receiving the predetermined communication data without inputting it into the receiving processing section.

11. The communication circuit according to claim 10, further comprising:

a response processing section which performs transferring process of the communication data;

a first selector connecting either the second receiving section or the

response processing section with the first transmitting section alternatively;

a second selector connecting either the first receiving section or the response processing section with the second transmitting section alternatively;

a third selector connecting either the first receiving section or the second receiving section with the receiving processing section alternatively; and

wherein the communication control section controls the first selector and the second selector to input the communication data received by one communication section receiving the predetermined communication data into the receiving process section and to input it into the transmitting section of other communication section, and controls the third selector to input the communication data received by the other communication section into the transmitting section of the communication section receiving the predetermined communication data without inputting the communication data into the receiving processing section, based on signal which states the predetermined communication data is received from either the first communication section or the second communication section.

12. The communication circuit according to claims 10–11, wherein

the first receiving section and the second receiving section convert inputted serial communication data into parallel communication data and receive it; and

the first transmitting section and the second transmitting section convert inputted parallel communication data into serial communication data and transfer it.

13. A display unit having the communication circuit recited in claims 10-12, further comprising:

a display section constituted by at least one light emitting elements;

a communication circuit communicating display data;

a memory storing the display data for at least one frame based on the display data received by the communication circuit; and

a driving section driving each of the light emitting elements in the display

section.

14. A terminal adaptor having the communication circuit recited in claims 10-12, wherein the communication circuit is capable to communicate with other terminal adaptors connected serially, the terminal adaptor further comprising:

a memory storing communication data received by the communication circuit; and

a communication section transferring the communication data stored in the memory to other terminals.